

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



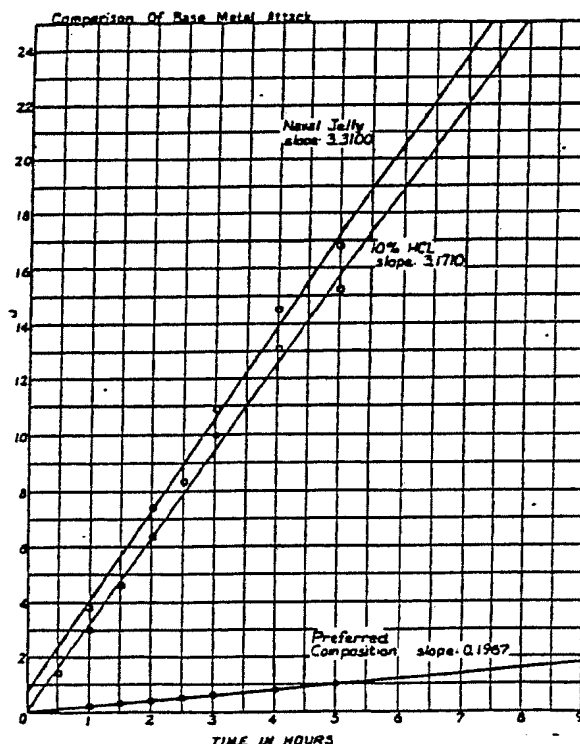
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification³ : C11D 7/08, 7/32</p>	<p>A1</p>	<p>(11) International Publication Number: WO 85/ 00379 (43) International Publication Date: 31 January 1985 (31.01.85)</p>
<p>(21) International Application Number: PCT/US83/01014 (22) International Filing Date: 6 July 1983 (06.07.83) (71) Applicant: FOTODYNE, INC. [US/US]; 16700 W. Victor Road, New Berlin, WI 53151 (US). (72) Inventor: VITEK, Richard, K. ; 16700 West Victor Road, New Berlin, WI 53151 (US). (74) Agent: BARRY, Ronald, E.; Frisch, Dudek and Slatery, Ltd., 825 North Jefferson Street, Milwaukee, WI 53202 (US). (81) Designated States: DE (European patent), FR (European patent), GB (European patent), JP.</p>		<p>Published <i>With international search report.</i> <i>With amended claims.</i></p>

(54) Title: **ACID BASED VARIABLE VISCOSITY COMPOSITIONS SUCH AS CORROSION AND GREASE REMOVERS AND POLISHERS**

(57) Abstract

An improved, highly penetrating rust remover and/or degreaser composition for metallic surfaces, which is chemically inhibited to substantially prevent oxidation-reduction reactions with a metal substrate and limit the action of the composition to a chemical attack on corrosion. The composition is preferably a single phase dispersion and includes respective quantities of an acid such as hydrochloric acid and phosphoric acid, an organic compound containing a nitrogen, oxygen or sulfur atom such as N-(2-hydroxyethyl) oxazolidine, an alcohol or other organic solvent for grease removal, water and one or more emulsifiers (e.g., a derivative of hydrogenated tallow) for stabilizing and lowering the surface tension of the resultant composition. The compositions may be formulated as liquids or with a viscosity control agent such as a polymer of vinyl pyrrolidone to give a paste-like consistency permitting easy use thereof on vertical surfaces. In other forms, the compositions hereof may include a mild abrasive such as activated silica gel.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	KR	Republic of Korea
AU	Australia	LI	Liechtenstein
BE	Belgium	LK	Sri Lanka
BG	Bulgaria	LU	Luxembourg
BR	Brazil	MC	Monaco
CF	Central African Republic	MG	Madagascar
CG	Congo	MR	Mauritania
CH	Switzerland	MW	Malawi
CM	Cameroon	NL	Netherlands
DE	Germany, Federal Republic of	NO	Norway
DK	Denmark	RO	Romania
FI	Finland	SD	Sudan
FR	France	SE	Sweden
GA	Gabon	SN	Senegal
GB	United Kingdom	SU	Soviet Union
HU	Hungary	TD	Chad
JP	Japan	TG	Togo
KP	Democratic People's Republic of Korea	US	United States of America

-1-

ACID BASED VARIABLE VISCOSITY COMPOSITIONS SUCH
AS CORROSION AND GREASE REMOVERS AND POLISHERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention is concerned with
improved, acid-based corrosion, grease removal and
polishing compositions for treating metallic surfaces
and objects. More particularly, it is concerned with
such compositions which are compounded so as to
10 substantially prevent oxidation-reduction reactions
that would normally take place at a metallic surface,
and allow only acid attack of the oxides on the
metal. In preferred forms, the compositions hereof
may include polyvinyl pyrrolidone as a viscosity
15 control agent and inhibitor, a derivative of
hydrogenated tallow as an emulsifier, and an
N-substituted oxazolidine as an acid inhibitor.



-2-

2. Description of the Prior Art

Compositions for removing corrosion (metal oxides) from metallic surfaces and objects have long been available. Generally speaking, such materials are acid based, i.e., they rely upon an acidic attack in order to remove corrosion.

A persistent problem encountered in connection with prior corrosion removal compositions and polishes stems from the fact that oxidation-reduction reactions can occur between the compositions and the underlying metal surfaces to be cleaned and decorroded. Hence, while many of these prior compositions were effective in corrosion removal and/or polishing, they often were prone to attack the metal substrate and leave the same pitted and unattractive.

Another problem with such prior compositions stems from the fact that they are ineffective as grease removers. Accordingly, if the metallic surfaces desired to be decorroded had substantial amounts of fatty organic (oil) films thereon, the effectiveness of the compositions was reduced, and the acidic and aqueous components thereof hindered in removal of corrosion.

Furthermore, such solutions were of uncontrolled viscosity, either being too viscous to prevent



-3-

application by spray or brush, or too low in viscosity to cling on vertical surfaces.

SUMMARY OF THE INVENTION

The present invention overcomes the problems noted above, and provides greatly improved, flowable, aqueous, highly penetrating compositions of acidic pH which are effective for polishing and removal of corrosion from metallic surfaces, and also to degrease the same. The compositions of the present invention may include respective quantities of an acid, an organic compound having a nitrogen, oxygen or sulfur atom therein, an alcohol or other organic solvent, water and at least one emulsifier.

In preferred forms, the acid component is selected from the group consisting of hydrochloric, sulfuric, phosphoric, acetic, citric, nitric, boric and mixtures thereof. The acid is further preferably present at a level of from about 2% to 95% by weight, and more preferably from about 5% to 37% by weight.

The organic compound is advantageously selected from the group consisting of N-substituted oxazolidines (most preferably N-(2-hydroxyethyl) oxazolidine), the p-alkyl benzyl pyridine chlorides, phenylthiourea, 2-mercaptobenzothiazole, di-ortho-tolyl-thiourea, pyridine, quinoline, decylamine, the dibenzyl sulfoxides, 2-butyne-1, 4-diol, 1-hexyne-



-4-

3-ol, 4-ethyl-1-octyne-3-ol, decyclamine, soyaamine, octadecylamine, trimethylsoyaammonium chloride, trimethyloctadecylammonium chloride, trimethyldecylammonium chloride, trimethyltallowammonium chloride, N-coco-1, 3-diaminopropane, the tetraalkylammonium bromides having an alkyl group with at least 10 carbon atoms therein, the mono-, di-, and tri-butylamines, hexamethylenediamine, polyvinyl pyrrolidone, 2-(bis)2-hydroxyethyl (amino)-1, 3-propanediol, 2-(bis)2-hydroxyethyl (amino)-methanedi-
amine, 1,6,8-triaza-4, 10-dioxabicyclo [5,5,0] dodecane, and mixtures thereof. Such compounds should be used at a level of from about 0.01% to 20% by weight, and more preferably from about .5% to 5% by weight.

The alcohol component is most preferably 1-propanol, but other alcohols could also be employed. As used herein, other alcohols refers to an alcohol having an alkyl group with from about 1 to 10 carbon atoms, inclusive. The alcohol should be used at a level of up to 40% by weight, and most preferably at a level of about 1 to 8% by weight.

The water should be present at a level of from about 30% to 80% by weight, and most advantageously at a level of from about 50% to 80% by weight.

The most preferred emulsifiers for use in the invention are selected from the group consisting of



-5-

the derivatives of hydrogenated tallow (e.g., N, N', N'-tris (2-hydroxy- ethyl)-N-tallow-1, 3-diamino-propane or amine acetate hydrogenated tallow), polyoxyethylene ethers, polyoxyethylene ester
5 alcohols, polyoxyethylene esters of mixed fatty and resin acids and mixtures thereof, although other specific types referred to hereinafter also have utility. The total amount of emulsifier present in the composition should be from about 0.1% to 15% by
10 weight, and more preferably from about .5% to 5% by weight.

A viscosity control agent (thickener) can also be used in the compositions hereof to give variations in viscosity. Such viscosity control has heretofore
15 proved to be difficult or impossible to obtain in acidic compositions, inasmuch as most conventional thickeners tend to flocculate at low pH. The control agents of the invention should be selected from the group consisting of polyvinylpyrrolidone and the
20 allylamine emulsion polymers. The pyrrolidone is preferred, however, inasmuch as it also acts as a corrosion inhibitor on metallic surfaces. The viscosity control agent should be used at a level of up to about 35% by weight, and most preferably at a
25 level of from about 0.5% to 5% by weight.

A synergistic effect is observed by the use of the mixture of polyvinyl pyrrolidone, Ethoduomeen



-6-

T/13, and N-(2-hydroxyethyl)-oxazolidine as a corrosion inhibitor in preventing base metal attack, inasmuch as the attack with the preferred mixture is less than that of any of the individual corrosion inhibitors.

5 In further forms of the invention, a mild abrasive such as activated silica gel (at a level of up to about 10% by weight) can be employed. Perfumes and coloring agents can be added as desired. In addition the system can be modified for corrosion removal on metal surfaces having a heavy grease or oil coating by preparing a two-phase emulsified system by the addition of toluene or related organic solvents.

15 BRIEF DESCRIPTION OF THE DRAWING

The single feature is a graphical representation depicting the extent of base metal attack when using a commercially available corrosion remover, 10% HCl, and the preferred corrosion removing composition of the invention.

20 DESCRIPTION OF THE PREFERRED EMBODIMENTS

The most preferred rust removal compositions in accordance with the present invention contain commercial hydrochloric acid, commercial phosphoric

-7-

acid, 1-propanol, N-(2 hydroxyethyl) oxazolidine, water, a thickening agent, and N,N', N'-tris(2-hydroxyethyl)-N-tallow-1, 3-diaminopropane as an emulsifier. The following table sets forth the single most preferred rust removal composition, as well as ranges of use of the above identified components.

TABLE I

10	<u>Component</u>	<u>Range</u>	<u>Amounts</u> (% by Weight) <u>Preferred</u>
	Commercial hydrochloric acid (37%)	2 -35%	27%
15	Commercial phosphoric acid (85%)	0 -10%	4%
	N-(2-hydroxyethyl) oxazolidine	0.01-20%	1%
	Ethoduomeen T/13 ¹	0.01-15%	1%
	1-propanol	0 -20%	5%
20	Polyvinylpyrrolidone ²	0 -15%	3%
	Water	30 -90%	<u>59%</u> 100%
25	1 N,N',N'-tris(2-hydroxyethyl)-N-tallow-1,3-diaminopropane, Sold by Armak Industrial Chemical Division, Chicago, Illinois.		
	2 Purchased from Sigma Chemical Co., St. Louis, Missouri, and reported to have a molecular weight of 360,000.		
30			



-8-

The oxazolidine base metal inhibitor component of Table I is prepared by slowly adding, with mixing, 435.7 grams of formaldehyde to a beaker containing 564.3 grams of diethanolamine. After all formaldehyde is added, the mixture should be stirred for an additional hour.

In other contexts, a base metal inhibitor component can be produced as the reaction product of a lower aldehyde (i.e., containing from about 1-4 carbon atoms) and an alkanolamine (containing one or more alkyl group each having from about 2-8 carbon atoms).

In formulating the preferred composition of Table I, a beaker containing 590 grams of water is provided. Ten grams of the Ethoduomeen T/13 hydrogenated tallow emulsifier, 270 grams hydrochloric acid, 40 grams phosphoric acid, and 50 grams of 1-propanol are all added to the beaker, with continual mixing. The mixture is then heated to 50° C.; and 30 grams polyvinylpyrrolidone is slowly added thereto. Mixing is continued until all of the polymer has dissolved.

The drawing graphically illustrates the inhibition against base metal attack provided with the preferred composition of Table I. Specifically, a commercially available corrosion remover sold under the designation "Naval Jelly" was tested, along with



-9-

a solution of 10% hydrochloric acid, and the preferred composition hereof. In all cases, testing conditions were identical, and the extent of attack on a base metal substrate was measured. As can be seen, the extent of such attack is very high with the Naval Jelly and hydrochloric acid, but is significantly lower with the preferred inhibitor composition of the invention.

In the case of a cleaner/polish for brass and copper, the most preferred compositions, and the ranges of use of components, are set forth below:

TABLE II

	<u>Component</u>	<u>Range</u>	Amounts (% by Weight) <u>Preferred</u>
15	Commercial hydrochloric acid (37%)	0 -37%	13.5%
20	Commercial phosphoric acid (85%)	0 -85%	2.0%
	N-(2-hydroxyethyl) oxazolidine	0.01-20%	0.5%
	Ethoduomeen T/13 ¹	0.01-15%	0.5%
	1-Propanol	0 -20%	2.5%
25	Polyvinyl-pyrrolidone ²	0 -35%	1.5%
	Water	30 -90%	79.5% 100.0%
30	1,2 Same as in Table I		



-10-

In preparative procedures all of the components save the polyvinylpyrrolidone are simply admixed as a single phase dispersion or solution, whereupon the mixture is heated to 50° C. (although such heating is optional) and the polymer is slowly added thereto with mixing to give a thickened, viscous composition.

As noted above, a number of different materials can be employed for the various components. With respect to the emulsifier(s), surfactants available from ICI Americas, Inc., Wilmington, Delaware, and Armak Chemicals Division, Chicago, Illinois, can be employed in lieu of or in addition to the preferred tallow based emulsifiers. An exemplary list of such surfactants is provided in Table III.

15

TABLE III

	<u>Trade Name</u>	<u>Class & Formula</u>	<u>HLB</u>
	Arlatone 285	Polyoxyethylene fatty acid ester	14.4
20	Arlatone 298	Polyoxyethylene fatty acid ester	14.4
	Arlatone G	Polyoxyethylene fatty glyceride	10.8
	Arlatone 970	Polyoxyethylene sorbitan fatty acid ester	14.3
25	Atlox 1285	Polyoxyethylene triglyceride	14.4



-11-

TABLE III

	<u>Trade Name</u>	<u>Class & Formula</u>	<u>HLB</u>
	Brij 35	Polyoxyethylene (23) lauryl ether	16.9
5	Brij 58	Polyoxyethylene (20) cetyl ether	15.7
	Brij 78	Polyoxyethylene (2) stearyl ether	15.3
10	Brij 98	Polyoxyethylene (20) oleyl ether	15.3
	Brij 99	Polyoxyethylene oleyl ether	15.3
15	Atlas G-263	N-cetyl-N-ethyl morpholinium ethosulfate	30.0
	Atlas G-271	N-soya-N-ethyl morpholinium ethosulfate	30.0
20	Atlas G-1285	Polyoxyethylene triglyceride	14.4
	Atlas G-1288	Polyoxyethylene triglyceride	16.0
	Atlas G-1300	Polyoxyethylene triglyceride	18.1
25	Atlas G-1304	Polyoxyethylene triglyceride	18.7
	Atlas G-1795	Polyoxyethylene lanolin derivative	17.0
30	Atlas G-2079	Polyoxyethylene palmitate	15.5
	Atlas G-2109	Polyoxyethylene coconut fatty acid	13.3
35	Atlas G-2162	Polyoxyethylene propylene glycol stearate	16.0



-12-

TABLE III

	<u>Trade Name</u>	<u>Class & Formula</u>	<u>HLB</u>
	Atlas G-3634A	Quaternary ammonium derivative	18.5
5	Atlas G-3707	Polyoxyethylene-lauryl-ether	12.8
	Atlas G-3816	Polyoxyethylene-cetyl-ether	14.9
10	Atlas G-3820	Polyoxyethylene-cetyl-ether	15.7
	Atlas G-4905	Polyoxyethylene-sorbitan-monoleate	15.0
	Atlas G-4932	Polyoxyethylene-lauryl-ether	16.0
15	Atlas G-4938	Polyoxyethylene-stearyl-ether	15.3
	Atlas G-4961	Polyoxyethylene-alky-amine	15.5
20	Atlas G-8916P	Polyoxyethylene-sorbitan-ester	14.6
	Myrj 49	Polyoxyethylene stearate	15.0
	Myrj 51	Polyoxyethylene stearate	16.0
25	Myrj 52	Polyoxyethylene stearate	16.9
	Myrj 52C	Polyoxyethylene stearate	16.9
30	Myrj 52S	Polyoxyethylene stearate	16.9
	Myrj 53	Polyoxyethylene stearate	17.9
	Myrj 59	Polyoxyethylene stearate	18.8



-13-

TABLE III

	<u>Trade Name</u>	<u>Class & Formula</u>	<u>HLB</u>
5	Renex 20	Polyoxyethylene ester of mixed fatty and resin acids	13.5
	Renex 30	Polyoxyethylene ether alcohol	14.5
	Renex 649	Polyoxyethylene alkylaryl-ether	16.0
10	Renex 650	Polyoxyethylene alkylaryl-ether	17.1
	Renex 678	Polyoxyethylene alkylaryl-ether	15.0
15	Renex 679	Polyoxyethylene alkylaryl-ether	14.4
	Renex 682	Polyoxyethylene alkylaryl-ether	13.9
	Renex 690	Polyoxyethylene alkylaryl-ether	13.3
20	Renex 698	Polyoxyethylene alkylaryl-ether	13.0
	Renex 707	Polyoxyethylene fatty acid alcohol	12.2
25	Renex 709	Polyoxyethylene fatty acid alcohol	12.5
	Renex 711	Polyoxyethylene fatty acid alcohol	13.9
	Renex 714	Polyoxyethylene fatty acid alcohol	14.9
30	Renex 720	Polyoxyethylene fatty acid alcohol	16.2
	Tween 20	Polyoxyethylene-sorbitan monolaurate	16.7



-14-

TABLE III

	<u>Trade Name</u>	<u>Class & Formula</u>	<u>HLB</u>
	Tween 20 SD	Polyoxyethylene-sorbitan monolaurate	16.7
5	Tween 40	Polyoxyethylene-sorbitan-monopalmitate	15.6
	Tween 60	Polyoxyethylene-sorbitan-monostearate	14.9
10	Tween 60 SD	Polyoxyethylene-sorbitan-monostearate	14.9
	Tween 80	Polyoxyethylene-sorbitan-monooleate	15.0
	Tween 80 SD	Polyoxyethylene-sorbitan-monooleate	15.0
15	Atlas G 3300	Alkyl aryl sulfonate	11.7

The compositions of the invention are effective to remove corrosion from base metallic surfaces while substantially preventing oxidation-reduction reactions with the metal itself. In addition, grease removal is enhanced by virtue of the presence of a single phase, aqueous system. Use of the preferred single phase system also enhances the penetration of corrosion where the latter is present.

Representative metals which can be cleaned and/or degreased using the compositions hereof include iron and steel, bronze, brass, copper, monel, nickel, chromium plated metals and aluminum.

A cleaner for tubes of boilers may also be provided by incorporating in the formulation a high



foaming agent plus thickeners such as polyvinyl-
pyrrolidone to improve wall adherence. This allows
the corrosion remover to be circulated and foamed in
place throughout the system by pumping or by an air
5 blast. An additive such as Arlatone G may also be
included as desired to help prevent surface
rerusting. This type of corrosion remover is
advantageous in that a small amount will cover a
large surface area and does not require heating to
10 permit the corrosion removal action to take place.
Also, since all components are water soluble, removal
of the corrosion remover can be performed by flushing
water through the system.

An exemplary formulation of a composition
15 containing at least one foaming agent and a thickener
is as follows:

TABLE IV

20	<u>Components</u>	<u>Permissible</u>		<u>Preferred</u>
		<u>Range</u>		<u>Composition</u> (% by Weight)
	Water	30	-90%	69.5%
	Commercial hydro- chloric acid (37%)	2	-37%	27.0%
	N(2-hydroxyethyl) oxazolidine	0.01-20%		1.0%
25	Ethoduomeen T/131 ¹	0.01-15%		1.0%



-16-

TABLE IV

	<u>Components</u>	<u>Permissible Range</u>	<u>Preferred Composition (% by Weight)</u>
5	Polyvinyl- pyrrolidone ²	0.1 -15%	1.0%
	Arlatone G ³	0.1 - 2%	<u>0.5%</u> 100.0%

10 1,2 Same as in Table I.

 3 See Table III.

 The preferred boiler tube cleaner is prepared in
the same manner as the rust remover and cleaner/
polisher described above. The Arlatone G component
15 is added initially with the HCl, oxazolidine and
Ethoduomeen.

 An additional use and formulation for the
removal of carbonate deposits and scales for the
application of salts to non-metallic surfaces can be
20 made by using the above formulations with the
deletion of the base metal corrosion inhibitor. This
formulation enhances surface deposit removal without
penetration to the base.

 An exemplary formulation of a composition
25 containing at least one degreasing agent and a
thickener is as follows:



-17-

TABLE V

	<u>Components</u>	<u>Permissible Range</u>	<u>Preferred Composition (% by Weight)</u>
5	Water	25-95%	77.0%
	Commercial hydro- chloric acid (37%)	2-37%	15.0%
	Rennex 30	0-10%	1.0%
10	Polyvinyl pyrrolidone	1-35%	5.0%
	Ammonium chloride	0-40%	<u>2.0%</u> 100.0%

Other acids such as sulfuric, nitric, phos-
phoric, acetic, citric, boric, or mixtures thereof
15 can be substituted as well as other salts such as
sodium perborate, tri-sodium phosphate, ammonium
acetate, sodium chloride, etc.



-18-

CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed, are defined as follows:

1. In a flowable, aqueous composition containing sufficient acid to give the composition an acidic pH, the improvement which comprises a minor amount of viscosity control agent in the composition selected from the group consisting of polyvinyl pyrrolidone and the allylamine emulsion polymers.
2. The composition as set forth in Claim 1, said agent being present at a level of up to about 35% by weight.
3. The composition as set forth in Claim 2, said level being from about 0.5 to 5% by weight.
4. The composition as set forth in Claim 1, said composition including an acid selected from the group consisting of hydrochloric, sulfuric, phosphoric, nitric, acetic, boric and mixtures thereof.
5. The composition as set forth in Claim 1, said acid being present at a level from about 2 to 95% by weight.
6. The composition as set forth in Claim 5, said level being from about 5 to 37% by weight.



-19-

7. The composition as set forth in Claim 1, said composition further including at least one emulsifier.

8. The composition as set forth in Claim 7, said emulsifier being present at a level of from about 0.01 to 15% by weight.

9. The composition as set forth in Claim 8, said level being from about 0.5 to 5% by weight.

10. The composition as set forth in Claim 7, said emulsifier comprising a derivative of hydrogenated tallow.

11. The composition as set forth in Claim 10, said emulsifier being N,N',N'-tris-(2-hydroxyethyl)-N-tallow-1,3-diaminopropane.

12. The composition as set forth in Claim 1, including a quantity of an organic compound having a nitrogen, oxygen or sulfur atom therein.

13. The composition as set forth in Claim 12, said compound being selected from the group consisting of N-substituted oxazolidines, the p-alkyl benzyl pyridine chlorides, phenylthiourea, 2-mercaptobenzo-
5 thiazole, di-ortho-tolyl-thiourea, pyridine, quinoline, decylamine, the dibenzyl sulfoxides, 2-butyne-1,4-diol, 1-hexyne-3-ol, 4-ethyl-1-octyne-3-ol, decylamine, soyaamine, octadecylamine, trimethylsoyaammonium chloride, trimethylocta-



-20-

- 10 decylammonium chloride, trimethyldodecylammonium chloride, trimethyltallowammonium chloride, N-coco-1, 3-diaminopropane, the tetraalkylammonium bromides having an alkyl group with at least 10 carbon atoms therein, the mono-, di-, and tributylamines,
- 15 hexamethylenediamine, polyvinyl pyrrolidone, 2-(bis)2-hydroxyethyl (amino)-1,3-propanediol, 2-(bis)2-hydroxyethyl (amino)-methane-diamine, 1,6,8-triaza-4,10-dioxabicyclo[5,5,0] dodecane, and mixtures thereof.

14. The composition as set forth in Claim 13, said compound being N-(2-hydroxyethyl) oxazoladine.

15. The composition as set forth in Claim 12, said compound being present at a level of from about 0.01 to 20% by weight.

16. The composition as set forth in Claim 15, said level being from about 0.5 to 5.0% by weight.

17. The composition as set forth in Claim 12, said compound being the reaction product of a lower aldehyde and an alkanolamine.

18. The composition as set forth in Claim 1, including an alcohol having an alkyl group containing from about 1 to 10 carbon atoms.

19. The composition as set forth in Claim 18, said alcohol being 1-propanol.



-21-

20. The composition as set forth in Claim 18, said alcohol being present at a level of up to about 20% by weight.

21. The composition as set forth in Claim 20, said level being from about 1 to 8% by weight.

22. The composition as set forth in Claim 1, said composition having water present at a level of from about 30 to 90% by weight.

23. The composition as set forth in Claim 22, said level being from about 50 to 80% by weight.

24. A flowable composition comprising respective quantities of water, acid, an organic compound having a nitrogen, oxygen or sulfur atom therein, a viscosity control agent selected from the group consisting of polyvinyl pyrrolidone and the allylamine emulsion polymers, and a derivative of hydrogenated tallow.

25. The composition as set forth in Claim 24, said derivative being N,N',N'-tris-(2-hydroxyethyl)-N-tallow-1,3-diaminopropane.

26. A flowable composition comprising respective quantities of water, acid, a viscosity control agent, an emulsifier, and an N-substituted oxazolidine.

27. The composition as set forth in Claim 26, said oxazolidine being N-(2-Hydroxyethyl) oxazolidine.



-22-

28. A flowable composition comprising
respective quantities of water, acid, a viscosity
control agent, an emulsifier, and a compound which is
the reaction product of a lower aldehyde and an
5 alkanolamine.



AMENDED CLAIMS

[received by the International Bureau on 29 December 1983 (29.12.83);
original claims 1,7, and 24 amended; other claims unchanged; three pages com-
prising the amended claims follow]

The embodiments of the invention in which an
exclusive property or privilege is claimed, are defined
as follows:

1. In a flowable, aqueous rust removal composition
containing sufficient acid to give the composition an acidic
pH, the improvement which comprises a minor amount of a
viscosity control agent and a minor amount of an inhibitor
5 in the composition to prevent base metal attack by the acid
component of the composition, said control agent being in
the composition selected from the group consisting of poly-
vinyl pyrrolidone and the allylamine emulsion polymers.

2. The composition as set forth in Claim 1, said
agent being present at a level of up to about 35% by weight.

3. The composition as set forth in Claim 2, said
level being from about 0.5 to 5% by weight.

4. The composition as set forth in Claim 1, said
composition including an acid selected from the group
consisting of hydrochloric, sulfuric, phosphoric, nitric,
acetic, boric and mixtures thereof.

5. The composition as set forth in Claim 1, said
acid being present at a level from about 2 to 95% by weight.

6. The composition as set forth in Claim 5, said
level being from about 5 to 37% by weight.

7. The composition as set forth in Claim 1, wherein
said inhibitor includes at least one emulsifier.



8. The composition as set forth in Claim 7, said emulsifier being present at a level of from about 0.01 to 15% by weight.

9. The composition as set forth in Claim 8, said level being from about 0.5 to 5% by weight.

10. The composition as set forth in Claim 7, said emulsifier comprising a derivative of hydrogenated tallow.

11. The composition as set forth in Claim 10, said emulsifier being N,N',N' -tris-(2-hydroxyethyl)-N-tallow-1,3-diaminopropane.

12. The composition as set forth in Claim 1, including a quantity of an organic compound having a nitrogen, oxygen or sulfur atom therein.

13. The composition as set forth in Claim 12, said compound being selected from the group consisting of N-substituted oxazolidines, the p-alkyl benzyl pyridine chlorides, phenylthiourea, 2-mercaptobenzo-
5 thiazole, di-ortho-tolyl-thiourea, pyridine, quinoline, decylamine, the dibenzyl sulfoxides, 2-butyne-1, 4-diol, 1-hexyne-3-ol, 4-theyl-1-octyne-3-ol, decylamine, soyaamine, octadecylamine, trimethylsoyaammonium chloride, trimethylocta-



20. The composition as set forth in Claim 18, said alcohol being present at a level of up to about 20% by weight.

21. The composition as set forth in Claim 20, said level being from about 1 to 8% by weight.

22. The composition as set forth in Claim 1, said composition having water present at a level of from about 30 to 90% by weight.

23. The composition as set forth in Claim 22, said level being from about 50 to 80% by weight.

24. A flowable rust remover composition having a minor amount of an inhibitor to prevent base metal attack by the acid component in said composition, said composition comprising respective quantities of water, acid, an organic compound having a nitrogen, oxygen or sulfur atom therein, a viscosity control agent selected from the group consisting of polyvinyl pyrrolidone and the allylamine emulsion polymers, and said inhibitor comprising a derivative of hydrogenated tallow.

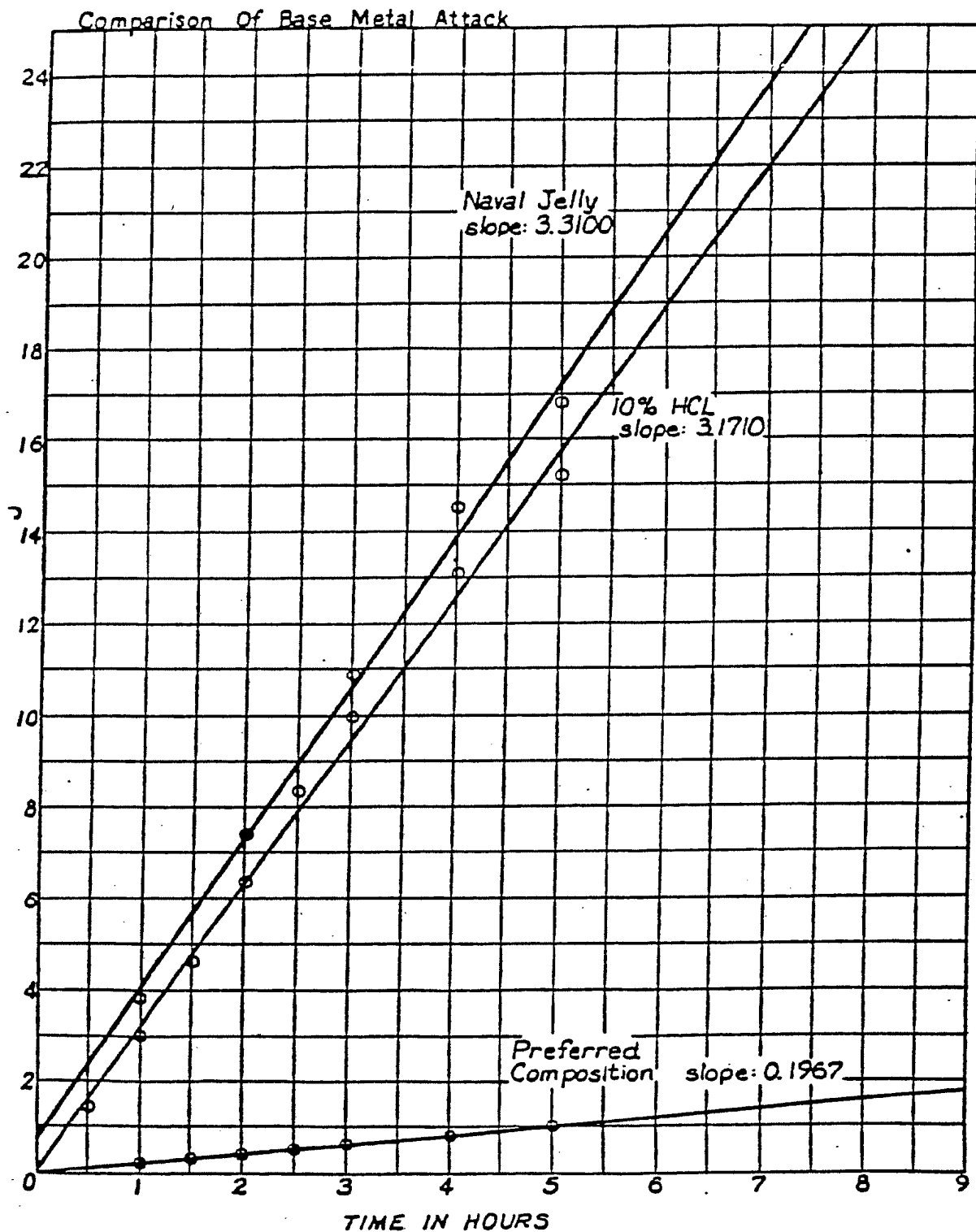
25. The composition as set forth in Claim 24, said derivative being N, N', N'-tris-(2-hydroxyethyl)-N-tallow-1, 3-diaminopropane.

26. A flowable composition comprising respective quantities of water, acid, a viscosity control agent, an emulsifier, and an N-substituted oxazolidine.

27. The composition as set forth in Claim 26, said oxazolidine being N-(2-Hydroxyethyl) oxazolidine.



1/1



SUBSTITUTE SHEET



INTERNATIONAL SEARCH REPORT

International Application No PCT/US83/01014

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ³ According to International Patent Classification (IPC) or to both National Classification and IPC INT. CL. C11D 7/08, 7/32, U.S. CL. 252/142, 143, 144, 145, 148, 149, 150, 151, 542																													
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Minimum Documentation Searched ⁴</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="vertical-align: top; padding: 5px;">U S</td> <td style="padding: 5px;"> 134/3, 40, 41 148/6.14R, 6.15R 252/81, 82, 86, 142, 143, 144, 145, 146, 148, 149, 150, 151, 155, 542 </td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵</div>			Classification System	Classification Symbols	U S	134/3, 40, 41 148/6.14R, 6.15R 252/81, 82, 86, 142, 143, 144, 145, 146, 148, 149, 150, 151, 155, 542																							
Classification System	Classification Symbols																												
U S	134/3, 40, 41 148/6.14R, 6.15R 252/81, 82, 86, 142, 143, 144, 145, 146, 148, 149, 150, 151, 155, 542																												
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴ <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category ⁶</th> <th style="border-bottom: 1px solid black;">Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷</th> <th style="width: 15%; border-bottom: 1px solid black;">Relevant to Claim No. ¹⁸</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">JP, A, 54-15485 Published 05 February 1979</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-9, 12, 22-24</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">FR, A, 2,209,858 Published 09 August 1974</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-9, 12, 22-24</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US, A, 4,247,344 Published 01 January 1981, Tsuda et al.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-9, 12, 22-24</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 2,524,825 Published 10 October 1959 Pabst et al.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">12-14, 26, 27</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 3,113,113 Published 03 December 1963, Marsh et al.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">10-13, 24, 25</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 4,216,032 Published 05 August 1980, Hayner et al.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-9, 12, 22-24</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 4,325,744 Published 20 April 1982, Panayappan et al.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-9, 12, 22-24</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 2,814,593 Published 26 November 1957 Beiswanger et al.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">12, 13</td> </tr> </table>			Category ⁶	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸	X	JP, A, 54-15485 Published 05 February 1979	1-9, 12, 22-24	X	FR, A, 2,209,858 Published 09 August 1974	1-9, 12, 22-24	X	US, A, 4,247,344 Published 01 January 1981, Tsuda et al.	1-9, 12, 22-24	A	US, A, 2,524,825 Published 10 October 1959 Pabst et al.	12-14, 26, 27	A	US, A, 3,113,113 Published 03 December 1963, Marsh et al.	10-13, 24, 25	A	US, A, 4,216,032 Published 05 August 1980, Hayner et al.	1-9, 12, 22-24	A	US, A, 4,325,744 Published 20 April 1982, Panayappan et al.	1-9, 12, 22-24	A	US, A, 2,814,593 Published 26 November 1957 Beiswanger et al.	12, 13
Category ⁶	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸																											
X	JP, A, 54-15485 Published 05 February 1979	1-9, 12, 22-24																											
X	FR, A, 2,209,858 Published 09 August 1974	1-9, 12, 22-24																											
X	US, A, 4,247,344 Published 01 January 1981, Tsuda et al.	1-9, 12, 22-24																											
A	US, A, 2,524,825 Published 10 October 1959 Pabst et al.	12-14, 26, 27																											
A	US, A, 3,113,113 Published 03 December 1963, Marsh et al.	10-13, 24, 25																											
A	US, A, 4,216,032 Published 05 August 1980, Hayner et al.	1-9, 12, 22-24																											
A	US, A, 4,325,744 Published 20 April 1982, Panayappan et al.	1-9, 12, 22-24																											
A	US, A, 2,814,593 Published 26 November 1957 Beiswanger et al.	12, 13																											
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁶ * Special categories of cited documents: ¹⁶</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>																													
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> Date of the Actual Completion of the International Search ² 18 October 1983 </td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> Date of Mailing of this International Search Report ³ 24 OCT 1983 </td> </tr> <tr> <td style="border-bottom: 1px solid black; padding: 5px;"> International Searching Authority ¹ ISA/US </td> <td style="border-bottom: 1px solid black; padding: 5px;"> Signature of Authorized Officer ¹⁹ Prince Willis </td> </tr> </table>			Date of the Actual Completion of the International Search ² 18 October 1983	Date of Mailing of this International Search Report ³ 24 OCT 1983	International Searching Authority ¹ ISA/US	Signature of Authorized Officer ¹⁹ Prince Willis																							
Date of the Actual Completion of the International Search ² 18 October 1983	Date of Mailing of this International Search Report ³ 24 OCT 1983																												
International Searching Authority ¹ ISA/US	Signature of Authorized Officer ¹⁹ Prince Willis																												